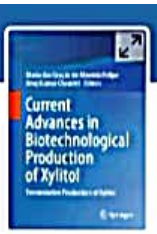


Current Advances in Biotechnological Production of Xylitol pp 33–50 | Cite as

Detoxification of Hemicellulosic Hydrolysates for Improved Xylitol Production

Rajendran Velmurugan, Ramesh Chander Kuhad, Arumugam Dhanesh Gandhi, Ranganathan Babujanarthanam & Aran Incharoensakdi

Chapter | First Online: 19 August 2022

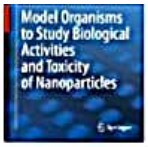
134 Accesses

Abstract

Xylitol, a naturally occurring sugar alcohol, is used in various medical and non-medical applications. The microbial production of xylitol from lignocellulosic biomass has gained much attention as the process is involved in greener synthesis. The production of xylitol from lignocellulosic biomass consists of disintegration of lignin–hemicellulose meshwork, hydrolysis to produce xylose, and microbial fermentation to convert xylose to xylitol. In microbial conversion, the generation of inhibitory products in hydrolysis is the rate limiting factor in xylose to xylitol conversion. The major inhibitory products include organic acids from lignin and furfural from cellulose and hydroxymethyl furfural from hemicellulose, respectively. As the inhibitors have their unique characteristic feature, the development of sugar-free, inhibitor specific detoxification process is difficult. Various bioprocesses including evaporation, neutralization, overliming, adsorption have been developed in which the calcium hydroxide, activated charcoal, ion-exchange resins and enzymes have been used so-far for detoxification. Recent progress on developing hybrid methods is interesting as the process undergoes two different principles aiming detoxification of chemically distinct inhibitors. In this chapter, the route of inhibitor generation, complications in biomass to xylitol conversion, methods used for detoxification and recent perspectives have been discussed.

Keywords

Lignocellulose Hemicellulose hydrolysate



Model Organisms to Study Biological Activities and Toxicity of Nanoparticles pp 243–266 | Cite as

Insecticidal Activity of Nanoparticles and Mechanism of Action

Sivakumar Saranya, Adikesavan Selvi, Ranganathan Babujanarthanam, Aruliah Rajasekar & Jagannathan Madhavan

Chapter | First Online: 29 March 2020

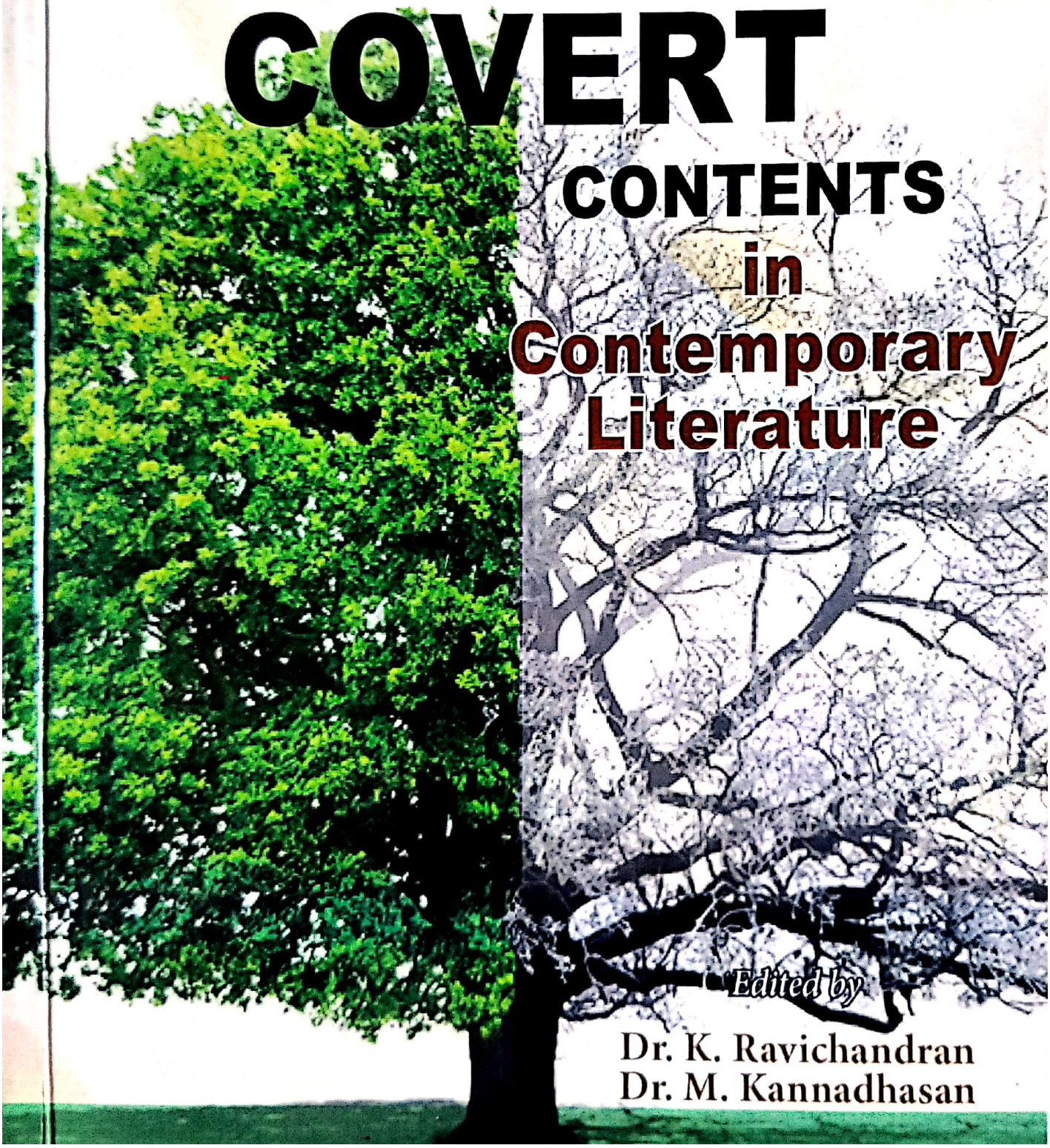
Abstract

The growth of population in the world and the requirement for food have urged the need to optimize the agriculture practices with minimal loss on fields. This can be achieved by the application of insecticides and pesticides. However, long-term application of these compounds has encountered serious environmental concerns of insecticide and pesticide resistance in plants and environmental deterioration. This has led to the ban of numerous deadly pesticides. However, this problem could be overcome with the development of various biological pest control agents. In recent years, nanotechnology has picked up prevalence at a fast pace in various field and disciplines with special mention in environmental and agricultural systems. In this regard, application of various nanoparticles has attracted many researchers worldwide to investigate and test their toxic potential against various insects and pests. Owing to the advantages, that is, affordability, availability, and easy synthesis, numerous inorganic and organic nanoparticles/composites, namely, titanium, gold, silver, silica, titanium dioxide, zinc oxide, iron and carbon, etc., have been successfully targeted against extensive range of noxious arthropods and agricultural pests and vectors. Therefore, the present chapter deals on different nanobased formulations employed against insects and pests, along with their mechanism of action. Based on many research reports, nanoparticles have been recognized as excellent candidates to combat insects and pests with their proven toxicity against mosquitoes and ticks. In addition, they are capable of exhibiting their toxicity at different stages of insects and pests. However, implementation of nanotechnology in agriculture, particularly in pest control, needs to be carefully evaluated to benefit the agricultural sector and the public health concerns of nanotoxicity.

Keywords

Nanoparticles Insecticidal Pesticidal Agriculture Environment Mechanism

THE OVERT and COVERT CONTENTS in Contemporary Literature



Edited by
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Journal of Education
Rabindra Bharati University

ISSN: 0972-7175
A Peer Reviewed Journal

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Published in

Journal of Education: Rabindra Bharati University
ISSN : 0972-7175

Vol. : XXIV, No. :1(XV), 2022

UGC CARE Approved, Peer Reviewed and Referred Journal

Editor
Journal of Education

Journal of Education
Rabindra Bharati University

ISSN: 0972-7175
A Peer Reviewed Journal

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This is to certify that the article entitled

CULTURAL AND RELIGIOUS IDENTITIES OF BLACKS: A CRITIQUE OF JAMES BALDWIN'S *GO TELL IT ON THE MOUNTAIN*

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Journal of Education: Rabindra Bharati University
ISSN : 0972-7175

Vol. : XXIV, No. :1(XV), 2022

UGC CARE Approved, Peer Reviewed and Referred Journal

Journal of Education
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Hydrocarbon Biotechnology (https://www.taylorfrancis.com/books/mono/10.1201/9781003277354/hydrocarbon-biotechnology?refId=5792f22d-8964-43fb-b6ce-b2fd66b7efb7&context=ubx)

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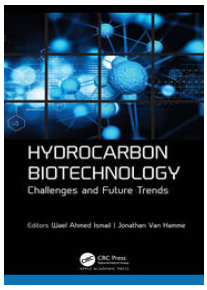
Chapter



Biosurfactants-Mediated Remediation of Hydrocarbon Pollution

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Edition	1st Edition
First Published	2022
Imprint	Apple Academic Press
Pages	24
eBook ISBN	9781003277354

< Previous Chapter (chapters/edit/10.1201/9781003277354-6/bacterial-chemotaxis-current-knowledge-future-need-application-hydrocarbon-remediation-technologies-nisenbaum-melina-georgina-corti-monz%C3%B3n-silvia-murialdo?context=ubx)
Next Chapter > (chapters/edit/10.1201/9781003277354-8/microbial-enhanced-oil-recovery-geetha-yahya-al-wahaibi-saif-al-bahry-abdulkadir-elshafie-ali-al-bemani-sanket-joshi?context=ubx)

Bionanotechnology in Robust Biosolar Cells

Authors

Ashwini Ravi, J Hemapriya, PN Sudha, S Sugashini, S Pavithra, S Vijayanand

Publication date

2023/10/13

Book

Nanobiomaterials

Pages

197-214

Publisher

CRC Press

Description

The increased energy consumption of an individual has increased today due to various technological improvements. Due to this increasing power consumption, the gradual development of demand on energy production has also increased. The production of energy for future generations leaves a threat to the depleting, non-renewable and non-sustainable source of energy production, the “fossil fuels”. In order to protect the natural gas for future generations and to increase energy production, several natural sources such as wind and tidal energy have been used. But the “solar energy”, which is available in plenty, and is an underused and a sustainable source of energy

Nanobiomaterials in Bioremediation

Authors

Ashwini Ravi, J Hemapriya, PN Sudha, S Revathi, R Sasirekha, S Vijayanand

Publication date

2023/10/13

Book

Nanobiomaterials

Pages

283-313

Publisher

CRC Press

Description

Bioremediation is the process of removing contaminants by biological entities such as plants and microbes. Various microbial species and plants have been studied extensively by researchers around the world for removing these xenobiotics from the environment. As advancement in the process of bioremediation, nanotechnology has been utilized in which nanoparticles synthesized by microbes and plants are employed. The advantages of nanomaterials such as higher diffusion and penetration rate than the microparticles, reactivity to redox components etc. made them advantageous in remediation. In addition to this, production of nanomaterials by biological entities further provides more advantage, making them environmentally risk free. Since nanoremediation is influenced with contaminant degradation rather than adsorption, the process was also found to be highly admissible. Bioremediation by nanoparticles …

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Nanobiomaterials in Bioremediation